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CLAIM AMENDMENTS

1. (Original) An optical emission analysis system configured for use with a source of excitation energy and a spectrograph including an image sensor having an array of pixels, the system comprising:

a probe for collecting optical sample data;

a source of calibration light; and

optical elements for directing the optical sample data and calibration light to the spectrograph so that adjacent data and calibration channels are formed on the image sensor.

2. (Original) The system of claim 1, wherein the optical sample data is representative of a Raman or fluorescence emission.

3. (Original) The system of claim 1, wherein each data channel is bounded on either side by an adjacent calibration channel.

4. (Original) The system of claim 1, wherein:

each data channel is bounded on either side by an adjacent calibration channel; and

interpolation is used between the calibration channels to determine the wavelength calibration of the data channel.

5. (Original) The system of claim 1, wherein the optical sample data is dispersed by a plurality of optical gratings such that higher and lower frequency components form different data channels on the image sensor, each adjacent to a calibration channel.

6. (Original) The system of claim 1, further including a broadband source of light that may be selectively directed onto the image sensor to directly determine binning ranges of calibration channels.

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7. (Original) The system of claim 6, wherein the binning ranges or data channels are determined by interpolation of the calibration channel binning.

8. (Original) The system of claim 1, further including:

a plurality of remote optical measurement probes; and

a plurality of optical switches for routing optical sample data from each probe to the spectrograph on a selective basis.

9. (Original) The system of claim 1, further including:

a plurality of remote optical measurement probes; and

a plurality of optical switches for routing optical sample data from each probe to the spectrograph on a simultaneous or sequential basis.

10. (Original) The system of claim 1, further including:

a plurality of lasers; and

optical switches for routing the light from the lasers to the probe on a selective basis.

11. (Original) The system of claim 1, wherein the data and calibration channels are tilted relative to the array of pixels.

12. (Original) The system of claim 1, further including:

a laser source; and

optical switches for:

a) selectively routing light from the laser source to a material having a known spectral response relative to the laser, and

b) selectively routing the known spectral response to the spectrograph for use as a laser wavelength calibration channel.

13. (Original) The system of claim 12, wherein the optical switches may be configured for use as laser shutter.

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14. (Original) The system of claim 12, wherein the material having a known spectral response is an edge-illuminated diamond wafer.

15. (Original) The system of claim 1, further including optical detectors at points where optical leakage may occur to provide system status or diagnostic information.

16. (Original) The system of claim 15, wherein the points where optical leakage may occur include optical fibers with controlled bends.

17. (Original) The system of claim 1, further including:

an intrinsically safe laser interlock circuit carrying a limited current to and from the optical measurement probe using wires cabled with the optical fibers to monitor the integrity of the cable link; and

an optical illuminator disposed at the location of the probe and connected to the circuit to simultaneously monitor optical path integrity and provide a visual indicator at a probe.

18. (Original) An optical emission analysis system configured for use with a source of excitation energy and a spectrograph including an image sensor having an array of pixels, the system comprising:

a probe for collecting optical sample data;

a source of calibration light;

a plurality of optical gratings operative to disperse the optical sample data into higher and lower frequency components that form different data channels on the image sensor; and

optical elements for directing the calibration light to the spectrograph so that the data channels are between calibration channels.

19. (Original) The system of claim 18, wherein the data and calibration channels are tilted relative to the array of pixels.

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20. (Original) The system of claim 19, further including a broadband source of light that may be selectively directed onto the image sensor to define calibration channel binning.

21. (Original) The system of claim 20, wherein the binning ranges or data channels are determined by interpolation of the calibration channel binning.

22. (Currently Amended) An optical emission analysis system configured for use with a laser source of excitation energy and a spectrograph including an image sensor having an array of pixels, the system comprising:

a probe for collecting optical sample data; [[and]]

a piece of diamond other material having a known spectral response relative to the laser, the piece being in the form of a flat sample having opposing surface areas and a peripheral edge with a height substantially smaller that the surface areas; and

a source of laser calibration wavelength light derived by [[edge-]] illuminating ~~a diamond~~ the edge of the sample ~~or other material having a known spectral response relative to the laser~~.

23. (Original) The system of claim 22, further including:

a first optical fiber for delivering the excitation energy to the edge of the material; and

a second optical fiber for carrying the known spectral response to the spectrograph.

24. (Original) The system of claim 22, further including an optical detector in proximity to the reference material for gathering at least a portion of the laser illumination to maximize laser intensity.

25. (Original) An optical emission analysis system configured for use with a source of excitation energy and a spectrograph including an image sensor having an array of pixels, the system comprising:

a probe for collecting optical sample data;

a source or calibration light;

optical elements for directing the optical sample data and calibration light to the spectrograph so that multiple channels are formed on the image sensor;

a broadband light source; and

one or more optical switches for routing the broadband light onto the image sensor to determine channel binning.

26. (Original) The system of claim 25, further including:

a plurality of optical gratings operative to disperse the optical sample data into higher and lower frequency components that form different data channels on the image sensor.

27. (Original) The system of claim 26, wherein the data and calibration channels are tilted relative to the array of pixels.

28. (Original) The system of claim 25, wherein the data and calibration channels are interleaved.

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